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increasing the costs faced by competitive LECs for obtaining network facilities above per-unit TELRIC levels would only further discourage competition needlessly by impairing the ability of CLECs to enter and compete with full vigor and ambition, and it would harm consumers and economic welfare.

V. INCREASED DELAY OR REDUCED QUALITY PRODUCE THE SAME EFFECT AS AN INCREASE IN NETWORK ELEMENT COST.

37. The failure of a CLEC to unbundle a network element has consequences beyond just cost. As a matter of economics, delays in a CLEC's ability to offer service as the result of the unavailability of UNEs, or degradations in the quality of service that CLECs can offer as the result of such unavailability, have the same impairing impacts on competition as would unavailability of a UNE at competitive cost-based prices.

38. *Delay.* Delay impairs the CLEC in at least two contexts. First, if an incumbent LEC's failure to unbundle a network element delays a CLEC's ability to enter a new market or to offer a new service in a market, then the CLEC plainly has been competitively impaired. With the UNE, the CLEC could have been offering service. Without the UNE, the CLEC is not. That is the clearest possible case of impairment.

39. Second, delay can manifest itself repeatedly and persistently such that if an incumbent LEC's failure to unbundle a network element delays a CLEC's ability to service a particular customer or to expand service to that customer, then the CLEC has been competitively impaired, to the injury of the customer. For example, if an incumbent LEC provisions second lines to households in three days and a CLEC can match that deployment only if it has access to a particular set of UNEs, the incumbent LEC's failure to unbundle that set of UNEs would

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impair the CLECs ability to offer an equivalent service. Similarly, a large business customer will be dissuaded from subscribing to a CLEC's service if it takes the CLEC six months to activate a new PBX service due to UNE unavailability, when the incumbent LEC can activate that service in one month. A CLEC cannot compete effectively if it encounters such delays on a recurring basis and, if it anticipates such delay, the CLEC most likely would choose not to enter a particular market at all.

40. *Quality.* In most instances, we would expect that if an incumbent LEC's failure to unbundle a network element forces the CLEC to use a lower quality alternative (both in terms of performance and capability), then the CLEC's ability to offer service is impaired. A decrease in quality will force the CLEC either to incur additional costs to correct the quality deficiency or to charge a lower price. Both responses, we have demonstrated, constitute impairment. The only exceptions would be quality decreases so insignificant that they neither raised the CLEC's costs nor degraded the quality of the end user service perceptibly.

VI. NATIONAL RULES REDUCE ENTRY BARRIERS BY DECREASING CLEC UNCERTAINTY AND AVOIDING THE COSTS GENERATED BY PERVASIVE NEGOTIATIONS AND LITIGATION.

41. It is crucial that the Commission adopt national unbundling requirements to reduce implementation and compliance costs. This is true for several reasons. First, national rules encourage the development of common interfaces and procedures. They reduce uncertainty and arbitrary regional differences, thereby lowering entry costs for CLECs seeking to compete in multiple states. National rules facilitate the realization of scale and scope economies. Second, national rules reduce regulatory uncertainty, which can help reduce capital costs and litigation. Third, national rules can ease interconnection negotiations. Fourth, national rules help promote

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national best practices and facilitate regulatory benchmarking, lowering monitoring costs. Finally, national rules accelerate the development of competition for customers in all localities, consistent with the intent of the Act. These important cost savings are recognized by the FCC and support the FCC's tentative conclusion to reaffirm national unbundling standards.

VII. CONCLUSION

42. Given the market conditions present in local telecommunications today, any increase in cost or delay, or a decrease in quality resulting from an incumbent LEC's failure to unbundle a network element will impair a CLEC's ability to offer service. The fact that a CLEC enters some markets does not imply that the unavailability of an unbundled network element does not impair a CLEC's ability to offer local service. Rather, as a matter of economic logic applied to the competitive standard, impairment arises whenever the viability or scope of CLECs' service offerings are reduced. As we have emphasized, a reduction in scope could manifest itself (i) geographically, (ii) as a reduction in the breadth of customers served, or (iii) as a decrease in the range of products. Impairment may also take the form of delayed entry into a particular geographic, customer, or product market.

43. Economically, then, impairment must be viewed from the multiple dimensions of all affected relevant markets for local exchange services. The Commission should ensure that its rules promote consumer welfare and competition in both the short-run and long-run by requiring incumbent LECs nationally to unbundle network elements wherever the evidence reasonably suggests that a CLEC's ability competitively to offer local or exchange access service would be impaired.

**Affidavit of
R. Glenn Hubbard**

I declare under penalty of perjury that the foregoing is true and correct. Executed on
May 25, 1999.

Robert Glenn Hubbard
R. Glenn Hubbard

SUBSCRIBED AND SWORN
TO ME BEFORE THIS
19 99
NOTARY PUBLIC

Eileen K. Potash
**EILEEN K. POTASH
NOTARY PUBLIC, STATE OF NEW YORK
NO. 31-4843742
QUALIFIED IN WESTCHESTER COUNTY
COMMISSION EXPIRES FEB. 17, 2000**

**Affidavit of
William H. Lehr**

I declare under penalty of perjury that the foregoing is true and correct. Executed on
May 25, 1999.



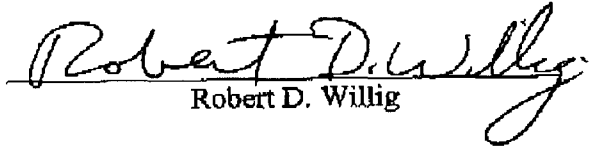
William H. Lehr



Daniel M. Barnard
NOTARY PUBLIC
My commission exp. Aug. 3, 2001

**Affidavit of
Robert D. Willig**

I declare under penalty of perjury that the foregoing is true and correct. Executed on
May 25, 1999.


Robert D. Willig

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ATTACHMENT 1

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ROBERT GLENN HUBBARD

Curriculum Vitae

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PERSONAL DATA

Born: September 4, 1958, in Orlando, Florida.
Marital Status: Married to Constance Pond Hubbard;
one child, Robert Andrew Pond Hubbard

FIELDS OF SPECIALIZATION

Public Economics, Macroeconomics, Corporate Finance and Financial Institutions, Industrial Organization, Natural Resource Economics, Public Policy.

EDUCATION

Ph.D., Economics, Harvard University, May 1983.
Dissertation: *Three Essays on Government Debt and Asset Markets*, supervised by Benjamin M. Friedman, Jerry A. Hausman, and Martin S. Feldstein.

A.M., Economics, Harvard University, May 1981.

B.A., B.S., Economics, University of Central Florida, June 1979, *summa cum laude*.

HONORS AND AWARDS

Best Paper Award for Corporate Finance, Western Finance Association, 1998.

Exceptional Service Award, U.S. Department of the Treasury, 1992.

Distinguished Alumnus Award, University of Central Florida, 1991.

John M. Olin Fellowship, National Bureau of Economic Research, 1987-1988.

Teaching Commendations, Graduate School of Business, Columbia University.

Northwestern University Associated Student Government Teaching Awards, announced in 1985, 1986, and 1987.

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Graduate Distinctions: National Science Foundation Fellowship, Alfred P. Sloan Foundation Fellowship.

Undergraduate Distinctions: National Merit Scholarship, National Society of Professional Engineers Award, Florida Society of Professional Engineers Award, National Council of Teachers of English Award, Omicron Delta Kappa, Financial Management Association Honor Society.

POSITIONS HELD

1994-present	Russell L. Carson Professor of Economics and Finance, Graduate School of Business, Columbia University.
1997-1998	Visiting Professor of Business Administration, Harvard Business School.
1994-1997	Senior Vice Dean, Graduate School of Business, Columbia University.
1988-1994	Professor of Economics and Finance, Graduate School of Business, Columbia University.
1995-present	Visiting Scholar and Director of Tax Policy Program, American Enterprise Institute.
1994	MCI Fellow, American Council for Capital Formation.
1994	John M. Olin Visiting Professor, Center for the Study of Economy and the State, University of Chicago.
1991-1993	Deputy Assistant Secretary (Tax Analysis), U.S. Department of the Treasury.
1987-1988	John M. Olin Fellow in residence at the National Bureau of Economic Research.
1983-1988	Assistant Professor of Economics, Northwestern University, with half-time research appointment in the Center for Urban Affairs and Policy Research.
1985	Visiting Scholar, Center for Business and Government, John F. Kennedy School of Government, Harvard University.
1981-1983	Teaching Fellow (Department of Economics) and Resident Tutor in Economics (Dunster House), Harvard University.

PROFESSIONAL ACTIVITIES

1987-present	Research Associate, National Bureau of Economic Research (Monetary Economics, Corporate Finance, Public Economics, Economic Fluctuations, Industrial Organization).
1997-present	Member, COSSA-Liaison Committee, American Economic Association.
1995-present	Member, Board of Academic Consultants, American Law Institute.
1993-present	Panel of Economic Advisors, Federal Reserve Bank of New York.
1993-present	Board of Advisors, Institutional Investor Project, School of Law, Columbia University.

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1997	Member, Grants Panel for Integrative Graduate Education and Research Training Program, National Science Foundation
1994-1996	Member, Economics Grants Panel, National Science Foundation.
1993-1996	Member, Federal Taxation and Finance Committee, National Tax Association.
1990-1995	Co-organized research program on International Aspects of Taxation at the National Bureau of Economic Research, Cambridge, Massachusetts.
1995	Member, Program Committee, American Economic Association Meeting
1983-1987	Faculty Research Fellow, National Bureau of Economic Research.
1983-1986	Adjunct Faculty Research Fellow, Energy and Environmental Policy Center, John F. Kennedy School of Government, Harvard University, Cambridge, Massachusetts.
1986, 1988, 1994	Member of the Brookings Panel on Economic Activity.
1985, 1987	Special guest of the Brookings Panel on Economic Activity.
1990-1991	Organized research program on Environmental Economics and Public Policy at the National Bureau of Economic Research, Cambridge, Massachusetts.
1988-1990	Co-organized research program on Dynamic Models of Firms and Industries at the National Bureau of Economic Research, Cambridge, Massachusetts.
1985-1989	Organized research program and workshops on contracting in financial markets at the Summer Institute, National Bureau of Economic Research, Cambridge, Massachusetts.
1988	Organized Economic Fluctuations program on Industrial Economics and Macroeconomics, National Bureau of Economic Research, Stanford, California.
1986-1988	Organized research program and workshop on links between macroeconomics and industrial organization at the Summer Institute, National Bureau of Economic Research, Cambridge, Massachusetts.
1991	Member, Program Committee, Econometric Society Winter Meetings.
1982-1983	Member, Energy Modeling Forum VII Study Group, Stanford University, Stanford, California.
1981-present	Consultant on research projects with private corporations and government and international agencies, including the Internal Revenue Service, Social Security Administration, U.S. Department of Energy, U.S. Department of State, U.S. Department of Treasury, and U.S. International Trade Commission; National Science Foundation; The World Bank; Board of Governors of the Federal Reserve System; Federal Reserve Bank of New York; Congressional Budget Office.
Member:	American Economic Association, American Finance Association, Association for Public Policy and Management, Econometric Society, International Association of

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Energy Economists, National Tax Association, the Royal Economic Society, and the Institute for Management Science.

Referee: *American Economic Review*; *Canadian Journal of Economics*; *Columbia Journal of World Business*; *Econometrica*; *Economic Journal*; *Energy Economics*; *Energy Journal*; *International Finance*; *International Tax and Public Finance*; *Journal of Business*; *Journal of Business and Economic Statistics*; *Journal of Economic History*; *Journal of Economic Literature*; *Journal of Finance*; *Journal of Financial Economics*; *Journal of Financial Intermediation*; *Journal of Financial Services Research*; *Journal of Industrial Economics*; *Journal of International Money and Finance*; *Journal of Law and Economics*; *Journal of Macroeconomics*; *Journal of Money, Credit, and Banking*; *Journal of Monetary Economics*; *Journal of Political Economy*; *Journal of Public Economics*; *Journal of Regulatory Economics*; *Journal of Small Business Finance*; *Management Science*; *National Tax Journal*; *Quarterly Journal of Economics*; *Quarterly Review of Economics and Finance*; *RAND Journal of Economics*; *Review of Economic Dynamics*; *Review of Economic Studies*; *Review of Economics and Statistics*; *Review of Financial Economics*; *Scandinavian Journal of Economics*; *Southern Economic Journal*; National Science Foundation; C.V. Starr Center for Applied Economics (New York University); Addison-Wesley Publishing Company; Ballinger Press; Cambridge University Press; Harvard Business School Press; MIT Press; W.W. Norton; Oxford University Press.

Associate Editor: Federal Reserve Bank of New York *Economic Policy Review*; *Journal of Macroeconomics*; *Journal of Small Business Finance*; *International Finance*; *International Tax and Public Finance*; *National Tax Journal*.

Former Associate Editor: *Journal of Industrial Economics*

PUBLICATIONS AND PAPERS

Edited Volumes

Effects of Taxation on Multinational Corporations (with M. Feldstein and J.R. Hines), Chicago: University of Chicago Press, 1995.

Taxing Multinational Corporations (with M. Feldstein and J. R. Hines), Chicago: University of Chicago Press, 1995.

Studies in International Taxation (with A. Giovannini and J. B. Slemrod), Chicago: University of Chicago Press, 1993.

Financial Markets and Financial Crises, Chicago: University of Chicago Press, 1991.

Asymmetric Information, Corporate Finance, and Investment, Chicago: University of Chicago Press, 1990.

Textbook

Money, the Financial System, and the Economy, Reading: Addison-Wesley Publishing Company, 1st ed., 1994; 2nd ed., 1997.

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Publications

Articles

"Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance" (with C.P. Himmelberg and D. Palia), *Journal of Financial Economics*, forthcoming.

"A Reexamination of the Conglomerate Merger Wave in the 1960s" (with D. Palia), *Journal of Finance*, forthcoming.

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"Fundamental Tax Reform and Corporate Financial Policy" (with W.M. Gentry), in J.M. Poterba, ed., *Tax Policy and the Economy*, volume 12, Cambridge: MIT Press, 1998.

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"Social Security, Liquidity Constraints, and Pre-Retirement Consumption," *Southern Economic Journal* 51 (October 1985): 471-484.

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Writings on Public Policy

The Magic Mountain: Is There a Budget Surplus? (with K.A. Hassett), Washington, D.C.: American Enterprise Institute, 1998.

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"The Golden Goose: Understanding (and Taxing) the Saving of Entrepreneurs," in Gary D. Libecap, ed., *Advances in the Study of Entrepreneurship, Innovation, and Growth*, volume 10, Greenwich: JAI Press, 1998.

"U.S. Tax Policy and Multinational Corporations: Incentives, Problems, and Directions for Reform," in Dale W. Jorgenson and James M. Poterba, eds., *Borderline Case: International Tax Policy, Corporate Research and Development, and Investment*, Washington, D.C.: National Research Council, 1998.

"Is There a 'Credit Channel' for Monetary Policy?," *Federal Reserve Bank of St. Louis Review* 77 (May/June 1995): 63-77.

"U.S. Tax Policy and Foreign Direct Investment: Incentives, Problems, and Reform," *Tax Policy and Economic Growth*, Washington, DC: American Council for Capital Formation, 1995.

"The Use of 'Distribution Tables' in the Tax Policy Process," *National Tax Journal* 46 (December 1993): 527-537.

"Securities Transactions Taxes: Tax Design, Revenue, and Policy Considerations," *Tax Notes* (November 22, 1993): 985-1000.

"Corporate Tax Integration: A View from the Treasury Department," *Journal of Economic Perspectives* (Winter 1993): 115-132; reprinted in P. Roberti, ed., *Financial Markets and Capital Income Taxation in a Global Economy*, Amsterdam: North-Holland, 1998.

"The President's 1992 Health Care White Paper: An Economic Perspective," *National Tax Journal* 45 (September 1992): 347-356.

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"Household Income Changes Over Time: Some Basic Questions and Facts," *Tax Notes* (August 24, 1992).

"Household Income Mobility During the 1980s: A Statistical Assessment Based on Tax Return Data" (with J. Nunns and W. Randolph), *Tax Notes* (June 1, 1992).

"Debt Renegotiation," *Institutional Investor* 24 (June 1990).

"Petroleum Regulation and Public Policy" (with R. Weiner), in Leonard Weiss and Michael Klass (eds.), *Regulatory Reform: What Actually Happened*, Boston: Little, Brown, and Company, 1986.

"Natural Gas: The Regulatory Transition" (with R. Braeutigam), in Leonard Weiss and Michael Klass (eds.), *Regulatory Reform: What Actually Happened*, Boston: Little, Brown, and Company, 1986.

"Natural Gas Contracting in Practice: Evidence from the United States" (with R. Weiner), in Michael Hoel and Bruce Wolman (eds.), *Natural Gas Markets and Contracts, Contributions to Economic Analysis Series*, North-Holland, 1986.

"Contracting and Regulation Under Uncertainty: The Natural Gas Market" (with R. Weiner), in John P. Weyant and Dorothy B. Sheffield (eds.), *The Energy Industries in Transition: 1985-2000*, Boulder: Westview Press, 1985.

"Oil and OECD Economies: Measuring Stockpile Coordination Benefits" (with J. Marquez and R. Weiner), in Mark Baier (ed.), *Energy and Economy: Global Interdependencies*, Bonn: Gesellschaft für Energiewissenschaft und Energiepolitik, 1985.

"Managing the Strategic Petroleum Reserve: Energy Policy in a Market Setting" (with R. Weiner), *Annual Review of Energy* 10 (1985): 339-359.

"Modeling Oil Price Fluctuations and International Stockpile Coordination" (with R. Weiner), *Journal of Policy Modeling* 7 (Summer 1985): 339-359.

"Crude Oil Trading and Price Stability" (with R. Weiner), in William F. Thompson and David J. De Angelo (eds.), *World Energy Markets: Stability or Cyclical Change*, Boulder: Westview Press, 1985.

"Energy Price Shocks, Inflation, and Economic Activity: Simulation Results of the Hubbard-Fry Model", in Bert Hickman and Hillard Huntington (eds.), *Macroeconomic Impact of Oil Supply Shocks: Report of the Energy Modeling Forum VII Project*, 1985.

"Drawing Down the Strategic Petroleum Reserve: The case for Selling Futures Contracts" (with S. Devarajan), in Alvin Alm and Robert Weiner (eds.), *Oil Shock: Policy Response and Implementation*, Cambridge: Ballinger Press, 1983.

"Government Stockpiles in a Multi-Country World: Coordination versus Competition" (with R. Weiner), in Alvin Alm and Robert Weiner (eds.), *Oil Shock: Policy Response and Implementation*, Cambridge: Ballinger Press, 1983.

"The 'Sub-Trigger' Crisis: An Economic Analysis of Flexible Stock Policies" (with R. Weiner), *Energy Economics* 5 (July 1983): 178-189.

"Temporary Tax Reductions as Responses to Oil Shocks," in Alvin Alm and Robert Weiner (eds.), *Oil Shock: Policy Response and Implementation*, Cambridge: Ballinger Press, 1983.

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"Policy Analysis with Your Hands Tied: The Case of Disruption Tariff Under Oil Price Controls," in Fred S. Roberts (ed.), *Energy Modeling IV: Planning for Energy Disruptions*, Institute of Gas Technology, 1982.

Comments, Notes, and Reviews

"Financing Constraints and Corporate Investment: Response to Kaplan and Zingales," *Quarterly Journal of Economics*, forthcoming.

"Comment" on Charles Hadlock, Joel Houston, and Michael Ryngaert, "The Role of Managerial Incentives in Bank Acquisitions," *Journal of Financial Intermediation*, forthcoming.

"Comment" on Joseph Peek and Eric Rosengren, "Bank Lending and the Transmission of Monetary Policy," in Federal Reserve Bank of Boston, *Is Bank Lending Important for the Transmission of Monetary Policy?*, forthcoming.

"Comment" on D.H. Moss, "Courting Disaster?: The Transformation of Federal Disaster Policy Since 1903," in K.A. Froot, ed., *The Financing of Catastrophic Risk*, Chicago: University of Chicago Press, 1999.

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"Introduction," in M. Feldstein, J.R. Hines, and R.G. Hubbard, eds., *Taxing Multinational Corporations*, Chicago: University of Chicago Press, 1995.

"Investment Under Uncertainty: Keeping One's Options Open," *Journal of Economic Literature* 32 (December 1994): 1794-1807.

"Introduction," in A. Giovannini, R.G. Hubbard, and J. Slemrod, eds., *Studies in International Taxation*, Chicago: University of Chicago Press, 1993.

"Comment" on G. Peter Wilson, "The Role of Taxes in Location and Source Decisions," in A. Giovannini, R.G. Hubbard, and J.B. Slemrod, eds., *Studies in International Taxation*, Chicago: University of Chicago Press, 1993.

"Market Structure and Cyclical Fluctuations in U.S. Manufacturing: Reply" (with I. Domowitz and B.C. Petersen), *Review of Economics and Statistics*, 1993.

"Introduction," in R.G. Hubbard, ed., *Financial Markets and Financial Crises*, Chicago: University of Chicago Press, 1991.

"Introduction," in R.G. Hubbard, ed., *Asymmetric Information, Corporate Finance, and Investment*, Chicago: University of Chicago Press, 1990.

"Comment" on Alberto Giovannini and James R. Hines, Jr., "Capital Flight and Tax Competition: Are There Viable Solutions to Both Problems?," in A. Giovannini and C. Mayer, eds., *European Financial Integration*, London: Centre for Economic Policy Research, 1990.

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"Comment" on Roger H. Gordon and Jeffrey K. MacKie-Mason, "Effects of the Tax Reform Act of 1986 on Corporate Financial Policy and Organizational Form," in J.B. Slemrod, ed., *Do Taxes Matter?: Economic Impacts of the Tax Reform Act of 1986*, Cambridge: MIT Press, 1990.

"Comment" on James M. Poterba, "Tax Policy and Corporate Saving," *Brookings Papers on Economic Activity*, 1987:2.

"Comment" on Robert E. Hall, "Market Structure and Macro Fluctuations," *Brookings Papers on Economic Activity*, 1986:2.

"Comment" on Alan S. Blinder and Angus Deaton, "The Time-Series Consumption Function Revisited," *Brookings Papers on Economic Activity*, 1985:2.

"Comment" on Benjamin S. Friedman and Mark Warshawsky, "The Cost of Annuities: Implications for Saving Behavior and Bequests," in Zvi Bodie, John Shoven, and David Wise (eds.), *Pensions in the U.S. Economy*, Chicago: University of Chicago Press, 1987.

"Energy Security: Book Reviews," *Energy Journal* 4 (April 1983).

"When the Oil Spigot is Suddenly Turned Off: Some Further Thoughts" (with R. Weiner), *Journal of Policy Analysis and Management* 2 (Winter 1983).

Submitted Papers and Working Papers

How Entrepreneurial Are Not-for-Profit Hospitals?, Mimeograph, Columbia University, 1999.

"Taxing Multinationals" (with M. Devereux), Mimeograph, Columbia University, 1999.

"Are There Bank Effects in Borrowers' Costs of Funds?: Evidence from a Matched Sample of Borrowers and Banks." (With K.N. Kuttner and D.N. Palia), Mimeograph, Columbia University, 1999.

"Are Dividend Taxes and Imputation Credits Capitalized in Share Values?" (with T. Harris and D. Kemsley), Mimeograph, Columbia University, 1998.

"Corporate Payouts and the Tax Price of Corporate Retentions: Evidence from the Undistributed Profits Tax of 1936-37" (with P. Reiss), Working Paper No. 3111, National Bureau of Economic Research, September 1989.

"Market Structure, Durable Goods, and Cyclical Fluctuations in Markups" (with I. Domowitz and B. Petersen), Mimeograph, Northwestern University, 1987.

"Finite Lifetimes, Borrowing Constraints, and Short-Run Fiscal Policy" (with K. Judd), Working Paper No. 2158, National Bureau of Economic Research, 1987.

GRANTS RECEIVED

"Institutional Investors, Boards of Directors, and Corporate Governance," Korn/Ferry, 1997.

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"An Economic Analysis of Saving Incentives," Securities Industry Association, 1994, with Jonathan Skinner.

"Securities Transactions Taxes: Tax Design, Revenue, and Policy Considerations," Catalyst Institute, 1993.

"Precautionary Saving in the U.S. Economy," Bradley Foundation, 1989-1990, with Jonathan Skinner and Stephen Zeldes.

"Taxation, Corporate Leverage, and Financial Distress," Garn Institute for Finance, 1989-1990.

"Precautionary Saving in a Dynamic Model of Consumption and Labor Supply," National Science Foundation (Economics Group SES-8707997), 1987-1989, with Jonathan Skinner and Stephen Zeldes.

"Industrial Behavior and the Business Cycle: A Panel Data Study of U.S. Manufacturing," National Science Foundation (Economics Group SES-8420152), 1985-1987, with Ian Domowitz and Bruce Petersen.

"Efficient Contracting and Market Power: Evidence from the U.S. Natural Gas Market," Transportation Center, Northwestern University, Summer 1985.

"Constructing a Panel Data Base for Studies of U.S. Manufacturing," University Research Grants Committee, Northwestern University, 1985-1986.

"Economic Analysis of Multiple-Price Systems: Theory and Application," National Science Foundation (Regulatory Analysis and Policy Group, SES-8408805), 1984-1985.

"Contracting and Price Adjustment in Product Markets," University Research Grants Committee, Northwestern University, 1983-1984.

PAPERS PRESENTED

University Seminars

Bard College, University of Bergamo, Carleton, University of Chicago, Columbia, Emory, University of Florida, George Washington, Georgetown, Harvard, University of Illinois, Indiana University, Johns Hopkins, Laval, University College (London), University of Kentucky, London School of Economics, MIT, University of Maryland, Miami University, University of Michigan, University of Minnesota, New York University, Northwestern, Oxford, University of Pennsylvania, Princeton, Rice, University of Rochester, Stanford, University of Texas, Tufts, University of Virginia, University of Wisconsin, Virginia Tech, and Yale.

Conference Papers Presented

American Council for Capital Formation, Washington, DC, June 1994.

American Economic Association, New York, January 1999; New Orleans, January 1997; San Francisco, January 1996; Washington, D.C., January 1995; Boston, January 1994; Anaheim, January 1993; Washington D.C., December 1990; Atlanta, December 1989; New York, December 1988; Chicago, December 1987; New Orleans, December 1985; Dallas, December 1984.

AFFIDAVIT OF HUBBARD, LERH, AND WILLIG
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American Enterprise Institute, Conference on Multinational Corporations, February 1999; Conference on Income Inequality, January 1999; Conference on Transition Costs of Fundamental Tax Reform, November 1998; Conference Series on Social Insurance Reform, 1997-1998; Conference Series on Fundamental Tax Reform, 1995-1998; Conference on Distributional Analysis of Tax Policies, Washington, D.C., December 1993.

Association of Environmental and Resource Economists, Dallas, December 1984; San Francisco, December 1983.

Association of Public Policy Analysis and Management, New Orleans, October 1984; Philadelphia, October 1983.

Bipartisan Commission on Entitlement and Tax Reform, Washington, DC, June 1994.

Brookings Panel on Economic Activity, September 1994, April 1988, September 1987, September 1986, April 1986, September 1985.

Centre for Economic Policy Research Conference on Capital Taxation and European Integration, London, September 1989.

Conference on International Perspectives on the Macroeconomic and Microeconomic Implications of Financing Constraints, Centre for Economic Policy Research, Bergamo, Italy, October 1994.

Congressional Research Service Conference for New Members of Congress, Williamsburg, January 1999.

Eastern Economic Association, Boston, March 1988; Boston, February 1983.

Econometric Society, New Orleans, January 1997; San Francisco, January 1996; Washington, D.C., January 1995; New Orleans, January 1992; Washington, December 1990; Atlanta, December 1989; New York, December 1988; Chicago, December 1987; New Orleans, December 1986; New York, December 1985; Boston, August 1985; Madrid, September 1984; San Francisco, December 1983; Pisa, August 1983.

Energy Modeling Forum, Stanford University, August 1983; February 1983; August 1982.

European Commission, Conference on Taxation of Financial Instruments, Milan, June 1998.

Federal Reserve Bank of Boston, Annual Economic Conference, North Falmouth, Massachusetts, June 1995.

Federal Reserve Bank of Kansas City Symposium on "Financial Market Volatility--Causes, Consequences, and Policy Responses," Jackson Hole, Wyoming, August 1988.

Federal Reserve Bank of New York, Conference on Consolidation of the Financial Services Industry, New York, March 1998.

Federal Reserve Bank of St. Louis, Conference on Economic Policy, St. Louis, October 1994.

Hoover Institution, Conference on Fundamental Tax Reform, December 1995.

The Institute of Gas Technology, Washington, DC, May 1982.

The Institute of Management Science/Operations Research Society of America, Orlando, November 1983; Chicago, April 1983.

AFFIDAVIT OF HUBBARD, LERH, AND WILLIG
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International Association of Energy Economists, Boston, November 1986; Philadelphia, December 1985; Bonn, June 1985; San Francisco, November 1984; Washington, DC, June 1983; Denver, November 1982; Cambridge (England), June 1982; Houston, November 1981.

International Conference on the Life Cycle Model, Paris, June 1986.

International Institute of Public Finance, Innsbruck, August 1984.

International Seminar on Public Economics, Amsterdam, April 1997.

National Academy of Sciences, February 1997.

National Association of Business Economists, Boston, September 1996; Dallas, September 1992; New Orleans, October 1987.

National Bureau of Economic Research - IMEMO Conference on the American Economy, Moscow, August 1989.

National Bureau of Economic Research Summer Institute, July-August 1998; August 1997; July 1995; July 1994; July 1993; August 1992; July-August 1991; July-August 1990; July-August 1989; July-August 1988; July-August 1987; July-August 1986; July 1985; July 1984; July 1983.

National Bureau of Economic Research Conference on Asymmetric Information, Corporate Finance, and Investment, Cambridge, May 1989.

National Bureau of Economic Research Conference on Financial Crises, Key Biscayne, March 1990.

National Bureau of Economic Research Conference on Government Expenditure Programs, Cambridge, November 1986.

National Bureau of Economic Research Conference on International Taxation, Washington, DC, April 1994; Cambridge, January 1994; New York, September 1991; Nassau, Bahamas, February 1989.

National Bureau of Economic Research Conference on Macroeconomics and Industrial Organization, Cambridge, July 1988; Cambridge, July 1987; Cambridge, July 1986; Chicago, November 1985.

National Bureau of Economic Research Conference on Pensions, Baltimore, March 1985; San Diego, April 1984.

National Bureau of Economic Research Conference on Productivity, March 1988; March 1987.

National Bureau of Economic Research Conference on Public Economics, Cambridge, April 1994, April 1993, November 1991, April 1991, March 1988, November 1987, March 1987.

National Bureau of Economic Research Conference on Tax Policy and the Economy, Washington, DC, November 1996, November 1994, November 1991, November 1989.

National Bureau of Economic Research Trans-Atlantic Public Economics Seminar, Turin, May 1994.

National Tax Association/Tax Institute of America, Arlington, May 1992; Seattle, October 1983.

AFFIDAVIT OF HUBBARD, LERH, AND WILLIG
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U.S. House of Representatives, Committee on Ways and Means, Washington, DC, April 1997, June 1996, July 1992.

U.S. Senate Committee on Finance, Washington, DC, February 1997, January 1995, January 1992, December 1981.

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ATTACHMENT 2

WILLIAM HERNDON LEHR
Curriculum Vitae

EDUCATION

Ph.D., Economics, Stanford University, 1992.
M.B.A., with distinction, The Wharton School, University of Pennsylvania, 1984.
M.S.E., Chemical Engineering, University of Pennsylvania, 1984.
B.S., Chemical Engineering, *cum laude*, University of Pennsylvania, 1979.
B.A., European History, *magna cum laude*, University of Pennsylvania, 1979.

Academic Honors: Graduate Student Research Award, Telecommunications Policy Research Conference, 1991; Lynde and Harry Bradley Foundation Fellowship, 1990; Stanford Fellowship, 1987

PROFESSIONAL EXPERIENCE

Graduate School of Business, Columbia University (New York, NY), Associate Research Scholar of Finance and Economics, 1997-present; Assistant Professor of Finance and Economics, July 1991 to December 1996.

Internet Telephony and Interoperability Consortium, Center for Technology, Policy and Industrial Development, Massachusetts Institute of Technology (Cambridge, MA), Research Affiliate, January 1997-present.

RAND Corporation (Santa Monica, CA), Graduate Student Intern, Summer 1990.

Economic Analysis Group, Ltd. (Washington, DC), Senior Consultant, 1985-1987.

M.C.I. Telecommunications (Washington, DC), Manager of Financial Analysis, 1985; Senior Financial Analyst, 1984.

Office of Management and Budget, National Security Division (Washington, DC), Graduate Student Intern, Summer 1983.

Putnam, Hayes and Bartlett (Cambridge, MA), Research Associate 1980-1982.

TEACHING EXPERIENCE

Internet Economics 101, 1998
Internet Telephony Tutorial, 1998
Internet Commerce Video Course, 1998 & 1999
Economics of Telecommunications Pricing, 1996, 1997

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Economics and Strategy in Media Industries, 1993-1995
Economics of Strategic Management, 1993
Managerial Economics, 1991-1995
Theory of the Firm (teaching assistant for Paul Milgrom), 1989

PAPERS and PUBLICATIONS

"Next Generation Bandwidth Markets," with Lee McKnight, forthcoming in Communications & Strategies.

"Telecommunication Regulation in the United States and Europe: The Case for Centralized Authority," with Thomas Kiessling, paper presented to the Twenty-sixth Telecommunications Policy Research Conference, Alexandria, VA, October 1998.

"The Flexible Specialization Path of the Internet," with Petros Kavassalis, forthcoming in *Beyond Convergence: Communications in the New Millenium*, Stockholm, Sweden.

"Forces for Integration and Disintegration in the Internet," with Petros Kavassalis, Communications and Strategies, Number 30, 2nd Quarter 1998, 135-154.

"Computer Use and Productivity Growth in Federal Government Agencies, 1987-92", with Frank Lichtenberg, Journal of Industrial Economics, Volume XLVI, Number 2, June 1998, 257-279.

"Understanding Vertical Integration in the Internet," mimeo, paper presented to Euro CPR '98 Conference, Venice, April 1998.

"Improving Local Exchange Competition: Regulatory Crossroads," with R. Glenn Hubbard, mimeo, Columbia University, February 1998.

"Information Technology and Its Impact on Productivity: Firm-level Evidence from Government and Private Data Sources, 1977-1993," with Frank Lichtenberg, mimeo, September 1997 (forthcoming, Canadian Journal of Economics)

"The Political Economy of Congestion Charges and Settlements in Packet Networks," with Martin Weiss, Telecommunications Policy, 20(3), April 1996, pages 219-31.

"Compatibility Standards and Industry Competition: Two Case Studies", Economics of Innovation and New Technology, 4(2), 1996, pages 97-112.

"Compatibility Standards and Interoperability: Lessons from the Internet", in Standards Policy for Information Infrastructure, edited by B. Kahin and J. Abbate, Harvard Information Infrastructure Project, Cambridge MA: MIT Press, 1995.